



Space Nutrition



Volume 1

Bone Up on Bone Health

Issue #9

Mission Facts

We are at approximately Launch minus 40 days (L-40). During the month of June, the PhAB-4 astronauts will complete their integrated training sessions and the final simulations. They will also participate in "TCDT," the Terminal Countdown Test, at about L-30. The crew travels to the Kennedy Space Center and practices launch day - up until just seconds before launch! This gives them another chance, close to flight, to get ready for the big moment. Everything on launch day is very carefully orchestrated, from crew wake-up through the start of the mission.



Career Facts

The research technicians coordinate sample collection, and process and analyze the samples during the sessions on the ground. On orbit, the crew takes care of collecting and processing the samples. Once the samples are received in the laboratory, technicians divide them into individual tubes for each test, and they are frozen until they are analyzed. Several laboratory methods are used to analyze the samples. Research technicians have degrees in nutrition, chemistry, biochemistry, and medical technology.

E381 (Calcium Kinetics During Space Flight), will provide valuable information about bone health during the early days of space flight. We will measure amounts of hormones and other chemicals in the crewmembers' blood and urine samples. All of these chemicals have an important role in bone health. We also measure the amounts of regular calcium and special forms of calcium, called calcium tracers, in the samples. The tracers are non-radioactive forms of calcium that are used to track the movement of calcium within the body. We measure the amounts of the tracers in blood, saliva, urine, and feces. We use these measurements with special mathematical formulas to trace the movement of calcium through the body - including in and out of the gut, and in and out of the astronauts' bones.

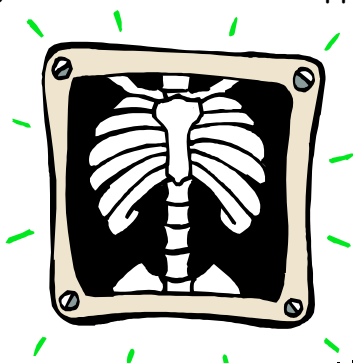


Once all the samples have been analyzed, researchers prepare tables and charts to summarize the results. This ends the data collection step of the research method. The research team will then put all the pieces of the "research puzzle" together - data from the calcium tracers, bone scans, urine, saliva, blood, feces, and diet. In the final step of the research method, the research team draws conclusions about the effects of space flight on bone health. We then write up our findings for publication in scientific journals for all scientists to read.

Our understanding of what happens to bones during space flight will help NASA plan the exploration missions of the future. It may also help us understand what happens to the bones of people with osteoporosis and other bone diseases.

Did you know?

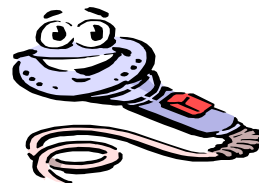
- Hormones are chemical messengers. Produced in glands or other organs, they are carried by the blood to their target tissue(s).
- Vitamin D is a hormone that is produced in the skin by exposure to sunlight. Vitamin D helps the body use calcium from the diet.
- Because the Shuttle is shielded to protect the astronauts from harmful rays of the sun, they are not able to produce vitamin D during space flight.
- PhAB-4 scientists will use a special x-ray machine to measure changes in bone and muscle mass before and after flight. These same bone scans are used to find out if people have osteoporosis.
- This will be our last newsletter for this volume. Look for our next volume to begin in October 2002. Happy Summer!



Word of the Month

Radioactivity

Radioactivity is the spontaneous decay of the nucleus of an atom. This decay produces high-energy radiation. While high-energy radiation can be harmful if a person is exposed to it too much, it has many good uses. It is used in medicine for cancer treatment, CAT scans, bone scans, and regular X-rays.



FUN CORNER

Find these "healthy bone" words:

Vitamin D	Collagen	Bone
Nutrient	Calcium	Scan
Exercise	Dairy	Xray
Milk	Sun	Food

I	X	R	V	A	D	O	O	F
T	N	E	I	R	T	U	N	S
X	O	E	T	B	O	N	E	B
B	V	S	A	R	C	O	Y	M
K	L	I	M	T	N	R	I	U
H	R	C	I	L	I	D	C	I
Y	N	R	N	A	C	S	R	C
A	B	E	D	F	U	L	E	L
R	G	X	D	N	E	E	X	A
X	N	E	G	A	L	L	O	C

Solution to Last Month's Crossword



Check out these cool NASA links for more fun space science facts:

<http://virtualastronaut.jsc.nasa.gov>
<http://lsda.jsc.nasa.gov>
<http://www.spaceflight.nasa.gov>



Check out the Nutritional Biochemistry Laboratory's website for more information about nutrition and space.

www.jsc.nasa.gov/sa/sd/facility/nutrition.htm